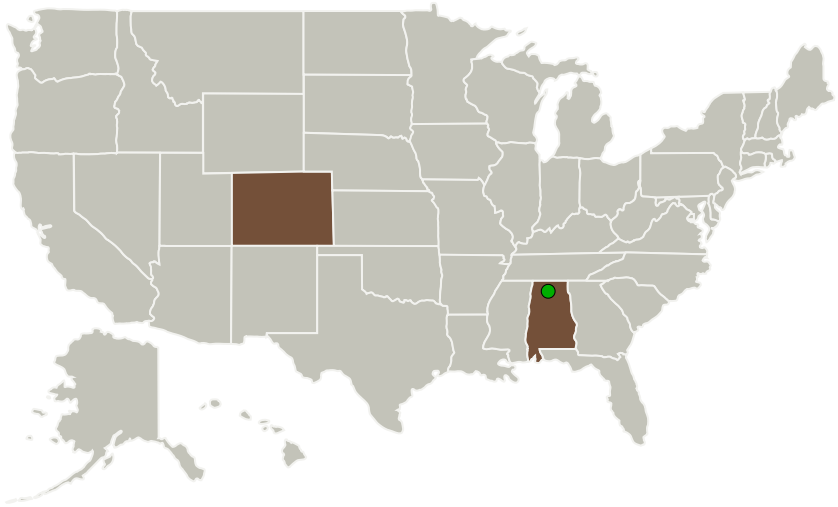
Lightweight Flexible Thermal Energy Management Panels for CubeSats, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

In response to significant gaps in advanced thermal control systems onboard CubeSats and SmallSats, and building off of the successful development of space-based FlexCoolTM two-phase thermal straps for CubeSats by its affiliated company i2C Solutions, Roccor proposes to develop a comprehensive thermal management component by adding a phase change material (PCM) thermal energy storage (TES) layer to the thin, flexible, high conductivity FlexCool thermal strap technology. The resulting Flexible Thermal Energy Management, (FlexTherm) product is a single thin flexible component that integrates easily into CubeSat geometries, operates reliably in vacuum, and efficiently serves thermal acquisition, transport, rejection and thermal energy storage functions with a minimum size and volume. To that end, the main objective of the proposed Phase I program is to demonstrate the technical feasibility of integrating PCMs with FlexCool, a thin, flat, flexible heat pipe technology whose feasibility was previously demonstrated for operation in the space environment. The PCM layer will include paraffin waxes as the matrix material inside a metal casing with an internal metal woven mesh. The internal mesh acts as a mechanical load bearing layer, as well as thermal conductivity enhancement material to spread heat into the TES materia

Primary U.S. Work Locations and Key Partners



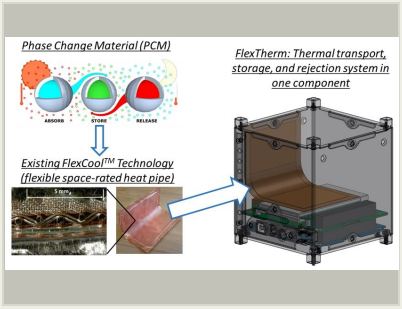


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Roccor, LLC	Lead Organization	Industry	Longmont, Colorado
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Colorado

Project Transitions

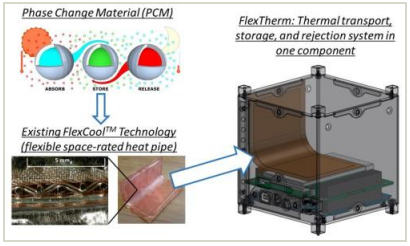
June 2016: Project Start

December 2016: Closed out

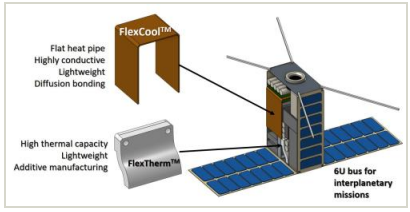
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139759)*

Images



Briefing Chart Image
Lightweight Flexible Thermal Energy Management Panels for CubeSats, Phase I
(https://techport.nasa.gov/image/131628)



Final Summary Chart Image
Lightweight Flexible Thermal Energy Management Panels for CubeSats, Phase I Project Image
(https://techport.nasa.gov/image/134131)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Roccor, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

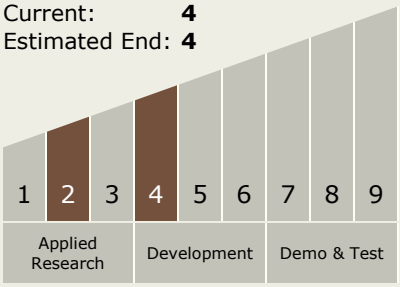
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Diego Arias

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Lightweight Flexible Thermal Energy Management Panels for CubeSats, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System